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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/666,470	09/19/2003	Chandramouli Visweswariah	YOR920030402US1	9381

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EXAMINER

LIN, SUN J

ART UNIT	PAPER NUMBER
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2825

DATE MAILED: 10/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/666,470

Applicant(s)

VISWESWARIAH,
CHANDRAMOULI

Examiner

Sun J. Lin

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-62 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 29-46, 48-55 and 57-62 is/are allowed.
- 6) ☒ Claim(s) 1, 9, 12-15, 17, 19, 21-28, 47 and 56 is/are rejected.
- 7) ☒ Claim(s) 2-8, 16, 18 and 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 09/19/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to application 10/666,470 filed on 09/19/2003. Claims 1 – 62 remain pending in the application.

Specification Objections

2. The specification is objected to because of following informalities:

Page 1, update status (e.g., Application Number) of co-pending U.S. Patent Applications listed in RELATED APPLICATIONS.

Appropriate correction is required.

Claim Objections

3. Claims listed below are objected to because of the following informalities:

Claim 1, line 1, before "criticality" insert **—timing—**.

Claim 1, line 1, change "in" to **—information of—**.

Claim 1, line 2, change "the netlist" to **—the circuit netlist—**.

Claim 1, line 10, change "the delay" to **—delay variation—**.

Claim 1, line 12, before "variation" insert **—delay—**.

Claim 1, line 13, before "timing" insert **—the—**.

Claim 2, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 2, line 1, change "where" to **—wherein—**.

Claim 2, line 2, before "one" insert **—each of—**.

Claim 3, line 1, change "A system, as in claim 1" to **—The system as recited in claim 2—**.

Claim 3, line 1, change "where" to **—wherein—**.

Claim 3, line 2, before "one" insert **—each of—**.

Claim 4, line 1, change "A system, as in claim 1" to **—The system as recited in claim 3—**.

Claim 4, line 1, change "where" to **—wherein—**.

Claim 4, line 1 – 2, change "the criticality probability" to **—a path criticality probability—**.

Claim 4, line 2, before "one" insert **—each of —**.

Claim 5, line 1, change "A system, as in claim 4" to **—The system as recited in claim 4—**.

Claim 5, line 1, change "where the" to **—wherein—**.

Claim 6, line 1, change "A system, as in claim 4" to **—The system as recited in claim 4—**.

Claim 6, line 1, change "where the" to **—wherein—**.

Claim 7, line 1, change "A system, as in claim 4" to **—The system as recited in claim 4—**.

Claim 7, line 1, change "where the" to **—wherein—**.

Claim 8, line 1, change "A system, as in claim 4" to **—The system as recited in claim 4—**.

Claim 8, line 1, change "where the" to **—wherein—**.

Claim 9, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 9, line 1, change "where the" to **—wherein—**.

Claim 9, line 2, before "circuit" insert **—electrical—**.

Claim 10, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 10, line 1, change "where the" to **—wherein—**.

Claim 11, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 11, line 1, change "where the" to **—wherein—**.

Claim 12, line 1, change "A method, as in claim 1" to **—The system as recited in claim 1—**.

Claim 12, line 1, change "where the" to **—wherein—**.

Claim 13, line 1, change "A method, as in claim 1" to **—The system as recited in claim 1—**.

Claim 13, line 1, change "where the" to **—wherein—**.

Claim 14, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 14, line 1, change "where" to **—wherein—**.

Claim 15, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 15, line 1, change "where" to **—wherein—**.

Claim 16, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 16, line 1, change "where" to **—wherein—**.

Claim 17, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 17, line 1, change "where" to **—wherein—**.

Claim 18, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 18, line 1, change "where" to **—wherein—**.

Claim 20, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 20, line 1, change "where" to **—wherein—**.

Claim 21, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 21, line 1, change "where" to **—wherein—**.

Claim 22, line 1, change "A system, as in claim 21" to **—The system as recited in claim 21—**.

Claim 22, line 1, change "where" to **—wherein—**.

Claim 23, line 1, change "A system, as in claim 21" to **—The system as recited in claim 21—**.

Claim 23, line 1, change "where" to **—wherein—**.

Claim 24, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 24, line 1, change "where" to **—wherein—**.

Claim 25, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 25, line 1, change "where" to **—wherein—**.

Claim 26, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 26, line 1, change "where" to **—wherein—**.

Claim 27, line 1, change "A system, as in claim 1" to **—The system as recited in claim 1—**.

Claim 27, line 1, change "where" to **—wherein—**.

Claim 27, line 1, change "each assertion" to **—each of the one or more assertions—**.

Claim 29, line 1, before "criticality" insert **—timing—**.

Claim 29, line 8, change "the arrival tightness" to **—an arrival tightness probability—**.

Claim 29, line 8, before "required" insert **—a—**.

Claim 29, line 8, change "probabilities" to **—probability—**.

Claim 29, line 10, after "probability" insert **—of each—**.

Claim 29, line 10, before "one" insert **—the—**.

Claim 29, line 11, before "one" insert **—the—**.

Claim 30, line 1, before "criticality" insert **—timing—**.

Claim 30, line 8, after "an arrival tightness" insert **—probability—**.

Claim 30, line 10, before "one" delete **—the—**.

Claim 30, line 12, before "one" insert **—the—**.

Claim 30, line 13, before "one" insert **—the—**.

Claim 31, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 31, line 1, change "where" to **—wherein—**.

Claim 31, line 1 – 2, change "the criticality" to **—a path criticality—**.

Claim 31, line 2, before "one" insert **—each of—**.

Claim 32, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 32, line 1, change "where" to **—wherein—**.

Claim 32, line 2, change "the path" to **—a path—**.

Claim 33, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 33, line 1, change "where" to **—wherein—**.

Claim 33, line 2, change "the path" to **—a path—**.

Claim 34, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 34, line 1, change "where" to **—wherein—**.

Claim 34, line 2, change "the path" to **—a path—**.

Claim 35, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 35, line 1, change "where" to **—wherein—**.

Claim 35, line 2, change "the path" to **—a path—**.

Claim 36, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 36, line 1, change "where" to **—wherein—**.

Claim 36, line 1, before "criticality" insert **—timing—**.

Claim 36, line 2, change "the path" to **—a path—**.

Claim 37, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 37, line 1, change "where" to **—wherein—**.

Claim 37, line 1, before "criticality" insert **—timing—**.

Claim 38, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 38, line 1, change "where" to **—wherein—**.

Claim 38, line 1, before "criticality" insert **—timing—**.

Claim 39, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 39, line 1, change "where" to **—wherein—**.

Claim 39, line 1, before "criticality" insert **—timing—**.

Claim 40, line 1, change "A method, as in claim 30" to **—The method as recited in claim 30—**.

Claim 40, line 1, change "where" to **—wherein—**.

Claim 41, line 1, change "A method, as in claim 29" to **—The method as recited in claim 29—**.

Claim 41, line 1, change "where" to **—wherein—**.

Claim 42, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 42, line 1, change "where" to **—wherein—**.

Claim 42, line 1, before "late mode" insert **—a—**.

Claim 42, line 2, after "determined" insert **—from the timing criticality information—**.

Claim 43, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 43, line 1, change "where" to **—wherein—**.

Claim 43, line 1, before "early-mode" insert **—an—**.

Claim 43, line 2, after "determined" insert **—from the timing criticality information—**.

Claim 44, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 44, line 1, change "where" to **—wherein—**.

Claim 45, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 45, line 1, change "where" to **—wherein—**.

Claim 46, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 46, line 1, change "where" to **—wherein—**.

Claim 48, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 48, line 1, change "where" to **—wherein—**.

Claim 48, line 1, before "circuit" insert **—electrical—**.

Claim 49, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 49, line 1, change "where" to **—wherein—**.

Claim 50, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 50, line 1, change "where" to **—wherein—**.

Claim 51, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 51, line 1, change "where" to **—wherein—**.

Claim 52, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 52, line 1, change "where" to **—wherein—**.

Claim 53, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 53, line 1, change "where" to **—wherein—**.

Claim 54, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 54, line 1, change "where" to **—wherein—**.

Claim 55, line 1, change "A method, as in claims 29 and 30" to **—The method as recited in claims 29 and 30—**.

Claim 55, line 1, change "where" to **—wherein—**.

Claim 55, line 1, change "each assertion" to **—each of the one or more assertions—**.

Claim 57, line 1, before "criticality" insert **—timing—**.

Claim 57, line 8, after "an arrival tightness" insert **—probability—**.

Claim 57, line 10, after "probability" insert **—of each—**.

Claim 57, line 10, before "one" insert **—the—**.

Claim 57, line 11, before "one" insert **—the—**.

Claim 58, line 1, before "criticality" insert **—timing—**.

Claim 58, line 8, after "an arrival tightness" insert **—probability—**.

Claim 58, line 10, change "each of the" to **—each of—**.

Claim 58, line 12, after "probability" insert **—of each—**.

Claim 58, line 12, before "one" insert **—the—**.

Claim 58, line 13, before "one" insert **—the—**.

Claim 59, line 1, before "criticality" insert **—timing—**.

Claim 59, line 8, after "an arrival tightness" insert **—probability—**.

Claim 59, line 8, change "probabilities" to **—probability—**.

Claim 59, line 10, after "probability" insert **—of each—**.

Claim 59, line 10, before "one" insert **—the—**.

Claim 59, line 11, before "one" insert **—the—**.

Claim 60, line 1, before "criticality" insert **—timing—**.

Claim 60, line 8, after "an arrival tightness" insert **—probability—**.

Claim 60, line 10, before "one" delete **—the—**.

Claim 60, line 12, after "probability" insert **—of each—**.

Claim 60, line 12, before "one" insert **—the—**.

Claim 60, line 13, before "one" insert **—the—**.

Claim 61, line 1, before "criticality" insert **—timing—**.

Claim 61, line 8, after "an arrival tightness" insert **—probability—**.

Claim 61, line 8, change "probabilities" to **—probability—**.

Claim 61, line 10, after "probability" insert **—of each—**.

Claim 61, line 10, before "one" insert **—the—**.

Claim 61, line 11, before "one" insert **—the—**.

- Claim 62, line 1, before "criticality" insert **—timing—**.
- Claim 62, line 8, after "an arrival tightness" insert **—probability—**.
- Claim 62, line 10, before "one" delete **—the—**.
- Claim 62, line 12, after "probability" insert **—of each—**.
- Claim 62, line 12, before "one" insert **—the—**.
- Claim 62, line 13, before "one" insert **—the—**.

Appropriate corrections are required.

Claim Rejections - 35 USC § 101 and 35 USC § 112

4. Claims 19, 28, 47 and 56 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a substantial asserted utility or a well-established utility. For examples:

Claim 19, terms "guard time" and "each timing test" do not mentioned in Claim 18 on which it depends upon.

Claim 47, terms "guard time" and "each timing test" do not mentioned in Claim 29 and/or Claim 30 on which it depends upon.

Claim 28, term "clock-edge information" does not relate to limitations as recited in Claim 1 on which it depends upon.

Claim 56, term "clock-edge information" does not relate to limitations as recited in Claim 29 and/or Claim 30 on which it depends upon.

Claims 19, 28, 47 and 56 are also rejected under 35 U.S.C. 112, first paragraph. Specifically, since the claimed inventions are not supported by either a substantial asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

6. Claims 1, 9, 12 – 15, 17 and 21 – 27 are rejected under 35 U.S.C. 102(a) as being unpatentable over IEEE paper entitled “Timing Minimization by Statistical Timing hMetis-based Partitioning” authored by Ababei et al.

7. As to Claim 1, Ababei et al. show and disclose the following subject matter:

- A simulation setup (i.e., system) for determining (timing) criticality information in an integrated circuit – [Fig. 4;abstract];
- A netlist input for receiving a gate netlist, which is a circuit schematic for a combinational circuit – [Fig. 4; Fig. 2(b); Section 3];
- Compute delays of wires using Elmore delay module – [Section 4]; Notice that the delays of wires are calculated based on boundary timing conditions associated with the wires under study;
- Sources of delay variation are captured using statistical timing analysis by considering gate and wire delays as stochastic variables (i.e., probability distribution functions **pdf**) – [Section 3]; Notice that a list of sources of delay variation is received for use in computing all criticalities in the circuit under study – [Section 4];
- (Parameterized) delay model utilizing **pdf** associated with each component (e.g., gate, wire) in the circuit under study – [Section 5];
- Criticality Computation is a process that determines and outputs timing criticality information of the circuit under study – [Fig. 4].

For reference purposes, the explanations given above in response to Claim 1 are called [Response A] hereinafter.

8. As to Claim 9, Ababei et al. show in Fig. 2 (a) and disclosed (1) critical path concept (2) a path with largest criticality in a circuit is the most critical in terms of timing – [Section 3]. Notice that a most critical path is one that has the highest probability of being critical.

9. As to Claim 12, Ababei et al. show and disclosed the subject matter in [Fig. 2].

10. As to Claim 13, Ababei et al. show and disclosed the subject matter in [Fig. 1; Fig. 2; Section 3].

11. As to Claim 14 and 15, a higher criticality value indicates a late mode criticality information; whereas a low criticality value indicates an early-mode criticality information.

12. As to Claim 17, Ababei et al. show in Fig. 2 and disclosed that the electrical circuit is a combinational circuit.

13. As to Claim 21, as included in [Response A] given above, Ababei et al. disclosed the parameterized delay model uses stochastic variables, which is an independent random variable.

14. As to Claims 22 and 23, the sources of variation are correlated or independent dependent upon the location (in the circuit) at which a component is considered – [Fig. 1].

15. As to Claims 24 – 26, the parameterized delay models can be (1) pre-stored in a table (2) pre-stored as coefficients of delay equations or (3) determined by circuit simulation on-the-fly dependent upon steps to be applied in the simulation set-up for use in Criticality Computation – [Fig. 4].

16. As to Claim 27, each of the one or more assertions can be deterministic or statistical dependent upon location of a component (of the circuit), which it is associated with.

Allowable Subject Matter

17. Claims 29 – 46, 48 – 55 and 57 – 62 are allowed. Claims 2 – 8, 16, 18 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Those claims are allowed is because that the prior art does not teach or fairly suggest the following subject matter:

- A system for determining timing criticality information of an electrical circuit wherein the timing criticality information is a node criticality probability of each of the one or more nodes of the electrical circuit in combination with other limitations as recited in independent **Claim 2**;
- A system for determining timing criticality information of an electrical circuit wherein a separate rising and a separate falling criticality information is determined from the timing criticality information in combination with other limitations as recited in independent **Claim 16**;
- A system for determining timing criticality information of an electrical circuit wherein the electrical circuit is a sequential circuit in combination with other limitations as recited in independent **Claim 18**;
- A system for determining timing criticality information of an electrical circuit wherein the electrical circuit contain multiple clock phases in combination with other limitations as recited in independent **Claim 20**;
- A method for determining timing criticality information of an electrical circuit comprises steps of building a timing graph that represents the electrical circuit, the timing graph having one or more nodes and one or more edges and determining a criticality probability of each of the one or more nodes of the timing graph and the one or more edges of the timing graph by a backward traversal of the timing graph in combination with other limitations as recited in independent **Claim 29** and **Claim 30**, respectively;
- A system for determining timing criticality information of an electrical circuit comprises means for building a timing graph that represents the electrical circuit, the timing graph having one or more nodes and one or more edges and means for determining a criticality probability of each of the one or more nodes of the timing graph and the one or more edges of the timing graph by a backward traversal of the timing graph in combination with other limitations as recited in independent **Claim 57** and **Claim 58**, respectively;
- A memory storage device storing a method for determining timing criticality information of an electrical circuit, the method comprises steps of building a timing graph that represents the electrical circuit, the timing graph having one or more nodes and one or more edges and determining a criticality probability of each of the one or more nodes of the timing graph and the one or more edges of the timing graph by a backward traversal of the timing graph in combination with

- other limitations as recited in independent **Claim 59** and **Claim 60**, respectively;
- An output product produced by a process for determining timing criticality information of an electrical circuit, the process comprises steps of building a timing graph that represents the electrical circuit, the timing graph having one or more nodes and one or more edges and determining a **criticality probability** of each of the one or more nodes of the timing graph and the one or more edges of the timing graph by a backward traversal of the timing graph in combination with other limitations as recited in independent **Claim 61** and **Claim 62**, respectively.

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sun J Lin whose telephone number is (571) 272 - 1899. The examiner can normally be reached on Monday-Friday 9:30AM - 6:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S Smith can be reached on (571) 272 - 1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sun J. Lin
Patent Examiner
Art Unit 2825
October 17, 2005

